REMARKS

Applicants appreciate the notification of allowable subject matter, i.e., that claims 6 and 13 are merely objected to, and would be allowable if rewritten in independent form.

Claims 1-16 are pending in the application. Claims 1, 9 and 14 have been amended by the present amendment. The amendments are fully supported by the specification as originally filed.

Applicants' claimed invention is directed to a substrate strip including a frame having two supporting bars, and at least one substrate linked to the supporting bars by means of a reduced number of tie bars, i.e., only one or two tie bars. In an embodiment using only one tie bar, the tie bar is provided at the substrate's gating corner (see FIGS. 5A and 5B). In embodiments utilizing two tie bars, the tie bars can be arranged at adjacent or diagonally opposite corners of the substrate (see FIGS. 2A, 2B and 3A, 3B, respectively), or where one tie bar is located at one corner and the other tie bar is linked to a side of the substrate (see FIGS. 4A and 4B).

The above-described substrate strip can provide significant benefits over the prior art. During a high-temperature step (such as molding, etc.) for fabricating a semiconductor package, when the substrate is subject to thermal stresses, the substrate strip of the Applicants' invention, with a reduced number of tie bars, permits free expansion toward the corners of the substrate not provided with tie bars, thereby preventing the substrate from becoming warped and ensuring appropriate planarity.

In contrast, prior art structures include substrates linked to supporting bars by four tie bars at four corners of the substrate, such that under high-temperature conditions, the substrate does not freely expand toward the corners thereof, making thermal stresses concentrate toward the center of the substrate and warp the substrate.

Moreover, as recited in claims 1, 9, and 14, the one or two tie bars of the Applicants' invention provide only a temporary link between the substrate and supporting bars. After the

semiconductor package is formed on the substrate, the tie bars are separated from the substrate (i.e., cut along the dotted lines shown in FIGS. 2-5) and are not retained in the semiconductor package, allowing the subsequently formed package to maintain high coplanarity (see, e.g., specification at page 4, lines 5-12).

Claims 1-3, 9, and 10 were rejected under 35 USC 102(b) as being anticipated by U.S. Patent 5,925,934 to Lim. Claims 4, 5, 11, and 12 were rejected under 35 USC 103(a) as being unpatentable over Lim. Claims 7 and 14-16 were rejected under 35 USC 103(a) as being unpatentable over Lim in view of U.S. Patent 5,847,446 to Park et al. (hereinafter "Park"). Claim 8 was rejected under 35 USC 103(a) as being unpatentable over "Lim and Park in view of admitted prior art." These rejections are respectfully traversed.

Lim and Park, whether taken alone or in combination, fail to teach or suggest a substrate strip utilizing one or two tie bars for linking a substrate to a frame so as to allow thermal expansion of the substrate toward corners of the substrate not having the tie bars. Moreover, Lim and Park do not teach or suggest tie bars which temporarily link the substrate to the supporting bars.

Lim is directed to a chip-sized package (CSP), as shown in FIGS. 10A and 11, having two tie bars 530 formed at opposite sides of a cavity 575 of a frame 570, the tie bars for supporting and holding a chip 505 via a die attach 540 within the cavity 575, so as to assure stability of the chip 505 during handling and especially during the encapsulation process (see column 7, lines 21-26). The tie bars 530 are severed from the frame 570 and remain attached to the chip 505 in the fabricated package (see column 6, lines 23-24).

Therefore, in Lim, the tie bars 530 are provided to secure the chip 505 in position during an encapsulation process, not to allow thermal expansion of the substrate and prevent package warpage, as taught in the Applicant's invention. Moreover, the tie bars 530 of Lim are encapsulated together with the chip and retained in the package, instead of being temporarily linked and then cut away from the chip.

Park cannot be combined with Lim to produce the Applicants' claimed invention, e.g., as recited in claim 14. Park discloses a chip attach pad 120 (see FIGS. 3 and 5) characterized by having at least one slot 124 formed in a perimeter region thereof, to allow a molding compound 160 to be contained within the slot 124 and adhered to the lower surface edges of the chip 110 so as to prevent the occurrence of delamination or cracking.

As stated in column 4, lines 23-26 (also cited in the Office Action), "[t]he package 200 ... may further comprise at least one tie-bar 122 which is joined to the chip attach pad 120. The tie-bar 122 provides the chip attach pad 120 with a mechanical stability." This disclosure in Park indicates that the tie-bar 122 is included in the finished package 200 and used for mechanically supporting the chip attach pad 120. Therefore, the tie-bar 122 is not temporarily provided, as required in the Applicants' claimed invention, but instead is retained in the package 200.

For at least the above reasons, Lim or Park, whether each reference is taken alone or in combination with the prior art, do not anticipate or otherwise render obvious the Applicants' claimed invention.

It is believed the application is in condition for immediate allowance, which action is earnestly solicited.

Respectfully submitted,

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APPENDIX A:
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS

Claims 1, 9, and 14 have been amended as follows:

1. (Amended) A substrate strip, which comprises:

(a) a frame having a pair of parallel supporting bars including a first supporting bar and a second supporting bar; and

(b) at least one substrate supported on the supporting bars[;], the substrate being temporarily linked to the supporting bars by means of no more than two tie bars, so as to allow thermally-induced expansion of the substrate to be directed toward corners of the substrate free of the tie bars, and allow the substrate to be free of connection to the tie bars in a semiconductor package formed on the substrate.

9. (Amended) A substrate strip, which comprises:

(a) a frame having a pair of parallel supporting bars including a first supporting bar and a second supporting bar; and

(b) at least one substrate supported on the supporting bars, the substrate being temporarily linked to the supporting bars by means of a two-point linkage structure consisting of just two tie bars linked to the supporting bars, so as to allow thermally-induced expansion of the substrate to be directed toward corners of the substrate free of the tie bars, and allow the substrate to be free of connection to the tie bars in a semiconductor package formed on the substrate.

14. (Amended) A substrate strip, which comprises:

(a) a frame having a pair of parallel supporting bars including a first supporting bar and a second supporting bar; and

(b) at least one substrate supported on the supporting bars, the substrate being temporarily linked to the supporting bars by means of a one-point linkage structure consisting of just one tie bar linked to one of the two supporting bars, so as to allow thermally-induced expansion of the

substrate to be directed toward corners of the substrate free of the tie bar, and allow the substrate to be free of connection to the tie bar in a semiconductor package formed on the substrate.